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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,858	07/25/2003	Stephen Duan-Fu Hsu	55071-267	9799

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EXAMINER	
PARIHAR, SUCHIN	
ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/626,858	HSU ET AL.
	Examiner	Art Unit
	Suchin Parihar	2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 July 2003 thru 11 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 July 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/11/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This application 10/626,858 has been examined. Claims 1-30 are pending

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 27 and 29 of Figure 3B; M1, M2, P1 and P2 of Figure 17. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description of Figure 5A: 71. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each

drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. Figures 1, 2a, 2b, 3a, and 3b should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1-3, 5-11, 13-19, 21-27 and 29-30 are rejected under 35 U.S.C. 102(e)** as being anticipated by Capodieci et al. (6,553,562).

6. With respect to claim 1, Capodieci teaches a method of generating masks for printing a pattern having vertically oriented features and horizontally oriented features on a substrate utilizing dipole illumination (Col 3, lines 51-65), said method comprising the steps of: identifying background areas contained in said pattern (Col 3, lines 65-66, i.e. identifying interconnection areas); generating a vertical component mask comprising non-resolvable horizontally oriented features in said background areas (Col 4, lines 14-18); and generating a horizontal component mask comprising non-resolvable vertically oriented features in said background area (Col 4, lines 8-11).

7. With respect to claim 2, Capodieci teaches all the elements of claim 1, from which the claim depends, herein. Capodieci teaches a method of generating masks wherein step of generating said vertical component mask includes: identifying horizontally oriented features contained in said pattern (Col 3, lines 61-63) and providing shielding for said horizontally oriented features (Col 4, lines 15-18, i.e. shield plan for horizontal critical features); applying optical proximity correction assist features to vertically oriented features contained in pattern (Col 8, lines 24-30, i.e. V-masks and H-masks contain type of OPC); and said vertical component mask being utilized to image said vertically oriented features on substrate (Col 3, lines 57-61, i.e. generating complementary mask patterns for use in imaging process).

8. With respect to claim 3, Capodieci teaches all the elements of claim 1, from which the claim depends, herein. Capodieci teaches a method of generating masks wherein step of generating said horizontal component mask includes: identifying vertically oriented features contained in said pattern (Col 3, lines 61-63) and providing

shielding for said vertically oriented features (Col 4, lines 9-11, i.e. shield plan for vertical critical features); applying optical proximity correction assist features to horizontally oriented features contained in said pattern (Col 8, lines 24-30, i.e. V-masks and H-masks contain type of OPC); horizontal component mask being utilized to image said horizontally oriented features on substrate (Col 3, lines 57-61, i.e. generating complementary mask patterns for use in imaging process).

9. With respect to claim 5, Capodieci teaches all the elements of claim 1, from which the claim depends, herein. Capodieci teaches a method of generating masks wherein said horizontally oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 34-38, i.e. rectangular portions of polygonal patterns that are HC critical features - in lieu of Figure 4, #22), each of parallel lines having same width (Col 8, lines 37-42, i.e. HC features based on predefined criteria... such as width).

10. With respect to claim 6, Capodieci teaches all the elements of claim 5, from which the claim depends, herein. Capodieci teaches a method of generating masks wherein horizontally oriented features have same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

11. With respect to claim 7, Capodieci teaches all the elements of claim 1, from which the claim depends, herein. Capodieci teaches a method of generating masks wherein vertically oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 42-45, i.e. rectangular portions of the polygonal

patterns that are VC features – in lieu of Figure 4, #23), each of individual lines having the same width (VC features based on predefined criteria... such as width).

12. With respect to claim 8, Capodieci teaches all the elements of claim 7, from which the claim depends, herein. Capodieci teaches a method of generating masks wherein vertically oriented features have same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

13. With respect to claim 9, Capodieci teaches a method of printing a pattern having vertically oriented features and horizontally oriented features on a substrate utilizing dipole illumination (Col 3, lines 51-65), said method comprising the steps of: identifying background areas contained in said pattern (Col 3, lines 65-66, i.e. identifying interconnection areas); generating a vertical component mask comprising non-resolvable horizontally oriented features in said background areas (Col 4, lines 14-18); generating a horizontal component mask comprising non-resolvable vertically oriented features in said background area (Col 4, lines 8-11); illuminating vertical and horizontal component masks utilizing X-pole and Y-pole illumination respectively (Col 3, lines 12-15, i.e. dipole apertures can be of various shapes and orientations, e.g. horizontal, vertical or at any given angle - in lieu of figure 3a-3h).

14. With respect to claim 10, Capodieci teaches all the elements of claim 9, from which the claim depends, herein. Capodieci teaches a method of printing a pattern wherein step of generating said vertical component mask includes: identifying horizontally oriented features contained in said pattern (Col 3, lines 61-63) and providing shielding for said horizontally oriented features (Col 4, lines 15-18, i.e. shield

plan for horizontal critical features); applying optical proximity correction assist features to vertically oriented features contained in pattern (Col 8, lines 24-30, i.e. V-masks and H-masks contain type of OPC); and said vertical component mask being utilized to image said vertically oriented features on substrate (Col 3, lines 57-61, i.e. generating complementary mask patterns for use in imaging process).

15. With respect to claim 11, Capodieci teaches all the elements of claim 9, from which the claim depends, herein. Capodieci teaches a method of printing a pattern wherein step of generating said horizontal component mask includes: identifying vertically oriented features contained in said pattern (Col 3, lines 61-63) and providing shielding for said vertically oriented features (Col 4, lines 9-11, i.e. shield plan for vertical critical features); applying optical proximity correction assist features to horizontally oriented features contained in said pattern (Col 8, lines 24-30, i.e. V-masks and H-masks contain type of OPC); horizontal component mask being utilized to image said horizontally oriented features on substrate (Col 3, lines 57-61, i.e. generating complementary mask patterns for use in imaging process).

16. With respect to claim 13, Capodieci teaches all the elements of claim 10, from which the claim depends, herein. Capodieci teaches a method of printing a pattern wherein shielding prevents illumination [imaging or printing] of horizontally oriented components when vertical component mask is illuminated (Col 7, lines 16-22).

17. With respect to claim 14, Capodieci teaches all the elements of claim 11, from which the claim depends, herein. Capodieci teaches a method of printing a pattern

wherein shielding prevents illumination of vertically oriented components when horizontal component mask is illuminated (Col 7, lines 16-22).

18. With respect to claim 15, Capodieci teaches all the elements of claim 9, from which the claim depends, herein. Capodieci teaches a method of printing a pattern wherein said horizontally oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 34-38, i.e. rectangular portions of polygonal patterns that are HC critical features - in lieu of Figure 4, #22), each of parallel lines having same width (Col 8, lines 37-42, i.e. HC features based on predefined criteria… such as width).

19. With respect to claim 16, Capodieci teaches all the elements of claim 15, from which the claim depends, herein. Capodieci teaches a method of printing a pattern wherein horizontally oriented features have same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

20. With respect to claim 17, Capodieci teaches all the elements of claim 9, from which the claim depends, herein. Capodieci teaches a method of printing a pattern wherein vertically oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 42-45, i.e. rectangular portions of the polygonal patterns that are VC features – in lieu of Figure 4, #23), each of individual lines having the same width (VC features based on predefined criteria… such as width).

21. With respect to claim 18, Capodieci teaches all the elements of claim 17, from which the claim depends, herein. Capodieci teaches a method of printing a pattern

wherein vertically oriented features have same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

22. With respect to claim 19, Capodieci teaches an apparatus for generating masks for printing a pattern having vertically oriented features and horizontally oriented features on a substrate (Col 3, lines 51-65), said method comprising: means for identifying background areas contained in said pattern (Col 3, lines 65-66, i.e. identifying interconnection areas); means for generating a vertical component mask comprising non-resolvable horizontally oriented features in said background areas (Col 4, lines 14-18); and means for generating a horizontal component mask comprising non-resolvable vertically oriented features in said background area (Col 4, lines 8-11).

23. With respect to claim 21, Capodieci teaches all the elements of claim 19, from which the claim depends, herein. Capodieci teaches an apparatus for generating masks wherein said horizontally oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 34-38, i.e. rectangular portions of polygonal patterns that are HC critical features - in lieu of Figure 4, #22), each of parallel lines having same width (Col 8, lines 37-42, i.e. HC features based on predefined criteria... such as width).

24. With respect to claim 22, Capodieci teaches all the elements of claim 21, from which the claim depends, herein. Capodieci teaches an apparatus for generating masks wherein horizontally oriented features have same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

25. With respect to claim 23, Capodieci teaches all the elements of claim 19, from which the claim depends, herein. Capodieci teaches an apparatus for generating masks wherein vertically oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 42-45, i.e. rectangular portions of the polygonal patterns that are VC features – in lieu of Figure 4, #23), each of individual lines having the same width (VC features based on predefined criteria... such as width).

26. With respect to claim 24, Capodieci teaches all the elements of claim 23, from which the claim depends, herein. Capodieci teaches an apparatus for generating masks wherein vertically oriented features have same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

27. With respect to claim 25, Capodieci teaches a computer program product (Col 14, lines 42-44, i.e. use of CAD tool) for controlling a computer comprising a recording medium readable by the computer, means recorded on the recording medium for directing the computer to generate files corresponding to masks for printing a pattern having vertically oriented features and horizontally oriented features (Col 3, lines 51-65) in a multiple-exposure lithographic imaging process (Col 3, lines 56-61), generation of files comprising: identifying background areas contained in said pattern (Col 3, lines 65-66, i.e. identifying interconnection areas); generating a vertical component mask comprising non-resolvable horizontally oriented features in said background areas (Col 4, lines 14-18); and generating a horizontal component mask comprising non-resolvable vertically oriented features in said background area (Col 4, lines 8-11).

28. With respect to claim 26, Capodieci teaches all the elements of claim 25, from which the claim depends, herein. Capodieci teaches a computer program product wherein step of generating said vertical component mask includes: identifying horizontally oriented features contained in said pattern (Col 3, lines 61-63) and providing shielding for said horizontally oriented features (Col 4, lines 15-18, i.e. shield plan for horizontal critical features); applying optical proximity correction assist features to vertically oriented features contained in pattern (Col 8, lines 24-30, i.e. V-masks and H-masks contain type of OPC); and said vertical component mask being utilized to image said vertically oriented features on substrate (Col 3, lines 57-61, i.e. generating complementary mask patterns for use in imaging process).

29. With respect to claim 27, Capodieci teaches all the elements of claim 25, from which the claim depends, herein. Capodieci teaches a computer program product wherein step of generating said horizontal component mask includes: identifying vertically oriented features contained in said pattern (Col 3, lines 61-63) and providing shielding for said vertically oriented features (Col 4, lines 9-11, i.e. shield plan for vertical critical features); applying optical proximity correction assist features to horizontally oriented features contained in said pattern (Col 8, lines 24-30, i.e. V-masks and H-masks contain type of OPC); horizontal component mask being utilized to image said horizontally oriented features on substrate (Col 3, lines 57-61, i.e. generating complementary mask patterns for use in imaging process).

30. With respect to claim 29, Capodieci teaches all the elements of claim 25, from which the claim depends, herein. Capodieci teaches a computer program product

wherein said horizontally oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 34-38, i.e. rectangular portions of polygonal patterns that are HC critical features - in lieu of Figure 4, #22), each of parallel lines having same width (Col 8, lines 37-42, i.e. HC features based on predefined criteria... such as width) and same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

31. With respect to claim 30, Capodieci teaches all the elements of claim 25, from which the claim depends, herein. Capodieci teaches a computer program product wherein vertically oriented features comprise a plurality of individual lines extending parallel to one another (Col 8, lines 42-45, i.e. rectangular portions of the polygonal patterns that are VC features – in lieu of Figure 4, #23), each of individual lines having the same width (VC features based on predefined criteria... such as width) and same pitch (Col 14, lines 15-20, i.e. invention applicable to lines and spaces with any given pitch).

Claim Rejections - 35 USC § 103

32. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

33. **Claims 4, 12, 20 and 28 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Capodieci in view of Applicant's admitted prior art (AAPA).

Capodieci teaches all the elements of claims 1, 9, 19 and 25, from which the claims 4, 12, 20 and 28 depend respectively, herein. Capodieci does not teach background area(s) of which do not contain any features to be imaged on a substrate. However AAPA, on lines 15-17 of the specification, disclose a background area where there are no features to be imaged on the wafer. It would have been obvious to one with ordinary skill in the art at the time of the invention to incorporate AAPA into the method/system of Capodieci because AAPA suggests that shielding techniques are utilized in situations that involve background areas that do not contain any features to be imaged onto a substrate (background, lines 7-9).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suchin Parihar whose telephone number is 571-272-6210. The examiner can normally be reached on Mon-Fri, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you

have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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